

Application No. 10/782,547  
Paper Dated: August 18, 2009  
In Reply to USPTO Correspondence of April 20, 2009  
Attorney Docket No. 4262-031383

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 10/782,547 Confirmation No. 3252  
Applicants : LARRY F. RHODES et al.  
Filed : February 19, 2004  
Title : VINYL ADDITION POLYCYCLIC OLEFIN  
POLYMERS PREPARED USING NON-OLEFINIC  
CHAIN TRANSFER AGENTS  
Group Art Unit : 1796  
Examiner : Robert D. Harlan  
Customer No. : 28289

Mail Stop Amendment  
Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

AMENDMENT

Sir:

In response to the Final Office Action dated April 20, 2009 from the Examiner in charge of the subject application, the following amendments and remarks are respectfully submitted for consideration. This Amendment is being filed as a submission under 37 C.F.R. §1.114(c), and is being filed concurrently with a Request for Continued Examination in the present case under 37 C.F.R. §1.114 along with the fee as set forth in 37 C.F.R. §1.17(e).

**Amendments to the Claims** are reflected in the listing of claims which begins on page 2 of this paper.

**Remarks** begin on page 10 of this paper.

I hereby certify that this correspondence is being electronically submitted to the United States Patent and Trademark Office on 08/18/2009.

08/18/2009  
Date

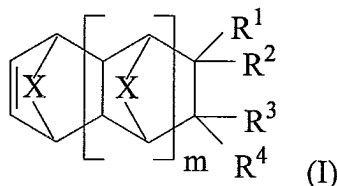
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Sharon L. Haney

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Claim <sup>4</sup>7. (Currently Amended) The method of claim <sup>3</sup>[4] ~~6~~, wherein the activator is ~~a compound containing an OH functional group selected from water and C<sub>1</sub>-C<sub>24</sub> linear, branched, and cyclic alkyl, aryl, and alkaryl moieties, in each case containing at least one hydroxyl group~~ alcoholic hydrogen as said active hydrogen.

Claim <sup>5</sup>8. (Currently Amended) The method of claim 1, wherein the poly(cyclic)olefin monomers comprise a first monomer according to Formula (I):



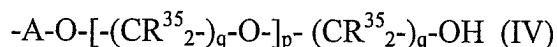
wherein X is selected from  $-\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}_2-$ , O, S, and  $-\text{NH}-$ ; m is an integer from 0 to 5; and each occurrence of  $\text{R}^1$ ,  $\text{R}^2$ ,  $\text{R}^3$  and  $\text{R}^4$  is independently selected from one of the following groups:

a) H, halogen, linear, branched or cyclic  $\text{C}_1$  to  $\text{C}_{30}$  alkyl, aryl, aralkyl, alkaryl, alkenyl or alkynyl;

b) linear or branched  $\text{C}_1$  to  $\text{C}_{24}$  halohydrocarbyls,  $-(\text{CH}_2)_n\text{C}(\text{O})\text{OR}^*$ ,  $-(\text{CH}_2)_n\text{C}(\text{O})\text{OR}'$ ,  $-(\text{CH}_2)_n\text{OR}$ ,  $-(\text{CH}_2)_n\text{OC}(\text{O})\text{R}$ ,  $-(\text{CH}_2)_n\text{C}(\text{O})\text{R}$ ,  $-(\text{CH}_2)_n\text{OC}(\text{O})\text{OR}'$ ,  $-(\text{CH}_2)_n\text{C}(\text{R})_2\text{CH}(\text{R})(\text{C}(\text{O})\text{OR}^{**})$ ,  $-(\text{CH}_2)_n(\text{CR}_2)_n\text{CH}(\text{R})(\text{C}(\text{O})\text{OR}^{**})$ ,  $-(\text{CH}_2)_n\text{C}(\text{OR}^{***})(\text{CF}_2)_2-$ ,  $-(\text{CR}''_2)_n\text{OR}$ ,  $-\text{CH}_2-[\text{O}(\text{CH}_2)_n]_{m^*}-\text{C}(\text{OR}^{***})(\text{CF}_3)_2$ ,  $-(\text{CH}_2)_n\text{C}(\text{R})_2\text{CH}(\text{C}(\text{O})\text{OR}^{**})_2$ ,  $-(\text{CH}_2)_n\text{C}(\text{O})\text{OH}$ ,  $\text{CH}_2)_n\text{C}(\text{R}^*)_2\text{CH}(\text{R}^*)(\text{C}(\text{O})\text{OH})$ ,  $-(\text{CH}_2)_n\text{C}(\text{O})-\text{O}-\text{R}^{18}$ ,  $-(\text{CH}_2)_n\text{C}(\text{CY}_3)_2\text{OH}$ , and  $-(\text{CH}_2)_n\text{C}(\text{R}^*)_2\text{CH}(\text{C}(\text{O})\text{OH})_2$ ; where each occurrence of R is independently selected from H and linear or branched  $\text{C}_1$  to  $\text{C}_{10}$  alkyl;  $\text{R}'$  is a linear or branched  $\text{C}_1$  to  $\text{C}_{10}$  alkyl or alkylol;  $\text{R}''$  is selected from H and halogen; n and  $m^*$  are each an integer from 0 to 10;  $\text{R}^*$  represents an acid labile group cleavable by a photoacid generator;  $\text{R}^{**}$  is selected from  $\text{R}'$  and  $\text{R}^*$  as defined above and tertiary  $\text{C}_4$  to  $\text{C}_{20}$  alkyl and cycloalkyl,  $\text{C}_1$  to  $\text{C}_6$  trialkylsilyl groups, and  $\text{C}_4$  to  $\text{C}_{20}$  oxoalkyl;  $\text{R}^{***}$  is selected from H,  $-\text{CH}_2\text{OR}'''$ ,  $-\text{C}(\text{O})\text{OR}'''$  and  $-\text{C}(\text{O})\text{R}'''$ , where  $\text{R}'''$  is selected from methyl, ethyl, t-butyl, and  $\text{C}_1$  to  $\text{C}_{20}$  linear or branched cycloaliphatic,  $\text{R}^{18}$  is selected from H, and linear, branched or cyclic  $\text{C}_1$ - $\text{C}_{24}$  alkyl, aryl, aralkyl, and alkaryl, Y is selected from F and Cl and at least one occurrence of Y is F;

e)  $C_1$  to  $C_{30}$  linear, branched, or cyclic alkyl, aryl, aralkyl, alkaryl, alkenyl or alkynyl containing one or more hetero atoms selected from O, N, and Si;

f) a hydroxy alkyl ether according to Formula (IV):



wherein A is a linking group selected from  $C_1$  to  $C_6$  linear, branched, or cyclic alkylene, each occurrence of  $R^{35}$  is independently selected from H, methyl, ethyl and a halide, q is from 1 to 5, and p is from 0 to 3;

g) a group according to Formula (V):



where  $R^{36}$  is a linear, branched or cyclic  $C_1$  to  $C_{30}$ , optionally partially or completely halogenated, alkylene, arylene, aralkylene, alkarylene, alkenylene or alkynylene linking group and Z is a functional group selected from hydroxyl, carboxylic acid, amine, thiol, isocyanate and epoxy; and


h)  $C_rX^{2r+1}$ , wherein  $X$  is independently a halogen selected from fluorine, chlorine, bromine or iodine and r is an integer from 1 to 20.

6. Claim 9. (Original) The method of claim 5, wherein  $m=0$ .


7. Claim 10. (Currently Amended) The method of claim 5, wherein  $m=0$ , at least one of  $R^1$ - $R^4$  is the hydroxy alkyl ether according to Formula (IV), and the remaining  $R^2$ ,  $R^3$ , and  $R^1$ - $R^4$  are each H in the poly(cyclic)olefin monomer.


8. Claim 11. (Original) The method of claim 5, wherein A is methylene or ethylene, each occurrence of  $R^{35}$  is H, q is from 2 to 5, and p is 0 in the poly(cyclic)olefin monomer.


9. Claim 12. (Currently Amended) The method of claim 5, wherein  $m=0$ , X is  $-CH_2-$ ,  $R^1$ ,  $R^2$  and  $R^3$  are hydrogen, and at least one of  $R^1$ - $R^4$  is


  
 $-(\text{CH}_2)_n-\text{C}(\text{OR}^{***})-(\text{CF}_3)_2$  where n and R<sup>\*\*\*</sup> is are each as defined above, and the remaining  
R<sup>1</sup>-R<sup>4</sup> are each H.

Claim 13. (Cancelled)

  
Claim 14. (Previously Presented) The method of claim 1, wherein the poly(cyclic)olefin monomer is selected from the group consisting of  $\alpha,\alpha$ -bis(trifluoromethyl)bicyclo[2.2.1]hept-5-ene-2-ethanol, 5-norbornene-2-methanol hydroxyethylether, t-butylester of norbornene 5-carboxylic acid, hydroxyethylester of 5-norbornene carboxylic acid, trimethylsilane ester of 5-norbornene carboxylic acid, 5-norbornene-2-methanol acetate, 5-norbornene-2-methanol, 5-norbornene-2-ethanol, 5-triethoxysilylnorbornene, 1-methylcyclopentyl ester of 5-norbornene carboxylic acid, tetrahydro-2-oxo-3-furanyl ester of 5-norbornene carboxylic acid, and mixtures thereof.

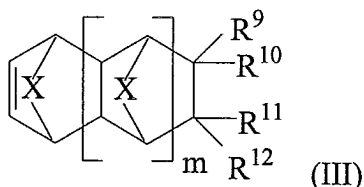
  
Claim 15. (Original) The method of claim 8, wherein the acid labile groups, denoted R\*, in the poly(cyclic)olefin monomer are selected from the group consisting of -C(CH<sub>3</sub>)<sub>3</sub>, -Si(CH<sub>3</sub>)<sub>3</sub>, isobornyl, 2-methyl-2-adamantyl, tetrahydrofuranyl, tetrahydropyranyl, 3-oxocyclohexanonyl, mevalonic lactonyl, dicyclopropylmethyl, dimethylcyclopropylmethyl and mixtures thereof.

  
Claim 16. (Original) The method of claim 8, wherein R\*\* in the poly(cyclic)olefin monomer is selected from the group consisting of tert-butyl, tert-amyl, 1,1-diethylpropyl, 1-methylcyclopentyl, 1-ethylcyclopentyl, 1-butylcyclopentyl, 1-methylcyclohexyl, 1-ethylcyclohexyl, 1-butylcyclohexyl, 1-ethyl-2-cyclopentenyl, 1-ethyl-2-cyclohexenyl, 2-ethyl-2-adamantyl, trimethylsilyl, triethylsilyl and dimethyl-tert-butylsilyl, 3-oxocyclohexyl, 4-methyl-2-oxooxan-4-yl, and 5-methyl-2-oxooxolan-5-yl.

  
Claim 17. (Previously Presented) The method of claim 8, wherein the

composition.

Claim 21. (Original) The method of claim 8, wherein the poly(cyclic)olefin monomers further comprise a third monomer according to Formula (III):



wherein  $m$  is an integer from 0 to 5;  $X$  is  $-\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}_2-$ ,  $\text{O}$ ,  $\text{S}$ , or  $-\text{NH}-$ ;  $\text{R}^9$  to  $\text{R}^{12}$  are independently selected from  $\text{H}$ , halogen, linear, branched or cyclic  $\text{C}_1$  to  $\text{C}_{30}$  alkyl, alkylol, aryl, aralkyl, alkaryl, alkenyl or alkynyl; a non-carboxylic acid group containing an active hydrogen with a  $\text{pK}_a$  of 15 or less, and a carboxylic acid substituents selected from the group consisting of those in accordance with the formulas  $-(\text{CH}_2)_q\text{C}(\text{O})\text{OH}$ ,  $(\text{CH}_2)_q\text{C}(\text{R}^{25})_2\text{CH}(\text{R}^{25})(\text{C}(\text{O})\text{OH})$  or  $(\text{CH}_2)_q\text{C}(\text{R}^{25})_2\text{CH}(\text{C}(\text{O})\text{OH})_2$ , wherein  $q$  is an integer from 0 to 10 and each occurrence of  $\text{R}^{25}$  is independently selected from  $\text{H}$ , halogen, linear, branched or cyclic  $\text{C}_1$  to  $\text{C}_{10}$  alkyl, and linear, branched or cyclic  $\text{C}_1$  to  $\text{C}_{10}$  halogenated alkyl; and

wherein at least one of  $\text{R}^9$  to  $\text{R}^{12}$  is a carboxylic acid substituent as described above.

Claim 22. (Original) The method of claim 21, wherein  $m=0$  in the third monomer.

Claim 23. (Original) The method of claim 21, wherein the groups  $\text{R}^1$  to  $\text{R}^4$  and  $\text{R}^9$  to  $\text{R}^{12}$  in the poly(cyclic)olefin monomers of Formula (I) and Formula (III) are independently selected such that three or more poly(cyclic)olefin monomers are included in the monomer composition.

Claim 24. (Previously Presented) The method of claim 1, wherein the chain transfer agent is one or more of an alkylsilane or alkylalkoxysilane selected from the group consisting of  $\text{Si-H}$  containing cyclotetrasiloxanes and compounds according to the formulae  $\text{HSiR}^{48}_3$ ,  $\text{HSi}(\text{OR}^{48})_1\text{R}^{48}_2$ ,  $\text{HSi}(\text{OR}^{48})_2\text{R}^{48}_1$ ,  $\text{Si}(\text{OSiR}^{49}_3)_4$ , and mixtures thereof,

wherein each occurrence of  $R^{48}$  is independently selected from linear, branched or cyclic  $C_1$  to  $C_{10}$  alkyl and each occurrence of  $R^{49}$  is independently selected from H and linear, branched or cyclic  $C_1$  to  $C_{10}$  alkyl, where at least one occurrence of  $R^{49}$  is H.

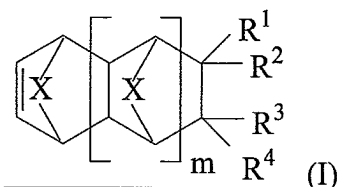
Claim <sup>21</sup>~~23~~. (Original) The method of claim <sup>20</sup>~~24~~, wherein the alkylsilanes are selected from the group consisting of triethylsilane, tri-isopropylsilane, and mixtures thereof.

Claim <sup>22</sup>~~26~~. (Original) The method of claim 1, wherein the combination of the monomer composition and catalyst is heated <sup>to</sup> a temperature sufficient to effect polymerization.

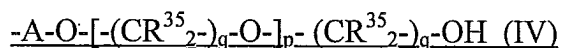
Claim <sup>23</sup>~~27~~. (Original) The method of claim <sup>22</sup>~~26~~, wherein the mixture is heated to a temperature of from 30 to 150°C.

Claims 28-39. (Cancelled)

Claim <sup>24</sup>~~40~~. (Currently Amended) A polymer comprising repeat units derived from the at least one of, a first monomer according to Formula (Ia), of claim 37



wherein X is selected from  $-CH_2-$ ,  $-CH_2-CH_2-$ , O, S, and  $-NH-$ , m is an integer from 0 to 5, and at least one of  $R^1-R^4$  is a hydroxy alkyl ether according to Formula (IV),



wherein A is a linking group selected from  $C_1$  to  $C_6$  linear, branched, or cyclic alkylene, each occurrence of  $R^{35}$  is independently selected from H, methyl, ethyl and a halide, q is from 1 to 5, and p is from 0 to 3, and the remaining  $R^1-R^4$  are each hydrogen,

and

a second monomer according to Formula (I) wherein,  $m=0$ , X is  $-CH_2-$ , and at least one of  $R^1-R^4$  is  $-(CH_2)_n-C(OR^{***})-(CF_3)_2$  where n is an integer